AD NUMBER

AD449533

LIMITATION CHANGES

TO:

Approved for public release; distribution is unlimited.

FROM:

**Distribution authorized to U.S. Gov't. agencies and their contractors;
Administrative/Operational Use; 30 SEP 1964.
Other requests shall be referred to Office of Naval Research, Arlington, VA 22203.**

AUTHORITY

ONR ltr 26 Oct 1977

449533

RF Project 691
Report No. 31

QUARTERLY

REPORT

by

THE OHIO STATE UNIVERSITY
RESEARCH FOUNDATION

1314 Kinnear Road
Columbus 12, Ohio

To: DEPARTMENT OF THE NAVY
Office of Naval Research
Contract No. Nonr 495(12)
ARPA Order No. 23-61; Task 1, Item 4

On: STRUCTURAL AND THERMODYNAMIC PROPERTIES OF POLYATOMIC MOLECULES AT ELEVATED TEMPERATURES

For the period: 1 January 1964 - 31 March 1964

Submitted by: David White
Department of Chemistry

Date: 30 September 1964

STRUCTURAL AND THERMODYNAMIC PROPERTIES OF
POLYATOMIC MOLECULES AT ELEVATED TEMPERATURES

During this report period a quantitative mass spectrometric investigation of the effect of oxygen pressure on the concentration of gaseous sodium and potassium oxides in equilibrium with solid Na_2O and K_2O was completed. These data confirm the results of the earlier preliminary studies on the composition of the vapor state. It is still not possible to report new values for the heats of formation of gaseous Na_2O, NaO, K_2O, and KO because of the uncertainty in extimating cross sections. An attempt is currently being made to determine these values experimentally.

The mass spectrometric studies also revealed the existence of both Na_2O_2 and K_2O_2 on the vapor phase. These species are considerably more abundant, relative to the monoxides, than the corresponding species observed in the lithium oxide system. Preliminary matrix isolation studies in the infrared region suggest however that these are peroxides rather than the rhombic form assigned to Li_2O_2.

Infrared studies of matrix-isolated $MgF_2(g)$ were initiated during the report period. The present data are not sufficiently complete to warrant a discussion of the molecule structure.

The manuscript describing the investigation of the infrared spectrum of matrix-isolated Al_2O has been submitted for publication.

Investigator _____ Date 11/12/64

Supervisor _____ Date 11/12/64

For The Ohio State University Research Foundation

Executive Director Robert C. Stephenson Date 11/12/64

DISTRIBUTION LIST

Contract No. Nonr 495(12)

	Addressee	Copies
1.	Mr. Thomas O. Dobbins Office of the Secretary of Defense Advanced Research Projects Agency Washington 25, D. C.	6
2.	Mr. John W. Murrin Bureau of Naval Weapons Code: RMMP-22 Department of the Navy Washington 25, D. C.	1
3.	Mr. B. J. Alley Propulsion Laboratory Code: AMSMI-RK Army Missile Command Redstone Arsenal, Alabama	1
4.	Mr. Curtis C. Selph Hq., 6593d Test Group Code: DGPS Air Force Systems Command Edwards, California	1
5.	Dr. Ralph Roberts Office of Naval Research Code: 429 Department of the Navy Washington 25, D. C.	2
6.	Dr. George Wyman Chemistry Division Army Research Office Box CM, Duke Station Durham, North Carolina	1
7.	Dr. Joseph Masi Chief, Propulsion Division (SREP) Air Force Office of Scientific Research Department of the Air Force Washington 25, D. C.	1

	Addressee	Copies
8.	Dr. Charles W. Beckett, Jr. Ass't Division Chief for Thermodynamics (3.00) Heat Division Room 107, West Building National Bureau of Standards Washington 25, D. C.	2
9.	Dr. John P. McCullough Petroleum Research Center U. S. Bureau of Mines Bartlesville, Oklahoma	1
10.	Mr. Jules J. Wittebort Code: ASRCPT Thermo-Physics Branch Directorate of Materials and Processes, ASD Wright-Patterson Air Force Base, Ohio	1
11.	Mr. Gerald Avery Chemical Propulsion Information Agency Applied Physics Laboratory 8621 Georgia Avenue Silver Spring, Maryland	3
12.	Dr. Daniel R. Stull The Dow Chemical Company Thermal Laboratory, Building 574 Midland, Michigan	2
13.	Mr. Charles B. Henderson Atlantic Research Corporation Shirley Highway and Edsall Road Alexandria, Virginia	1
14.	Dr. D. L. Hildenbrand Aeronutronic Division of Ford Motor Company Research Laboratories Ford Road Newport Beach, California	1
15.	Dr. John L. Margrave Department of Chemistry Rice University Houston, Texas	1
16.	Dr. Walter G. May ESSO Research and Engineering Company Special Projects Unit P. O. Box 51 Linden, New Jersey	1

	Addressee	Copies
17.	Mr. John S. Gordon Astro-Systems, Inc. 1275 Bloomfield Avenue Caldwell, New Jersey	1
18.	Dr. Billings Brown Hercules Powder Company P. O. Box 250 Salt Lake City 10, Utah	1
19.	Mr. William Mitchell Thiokol Chemical Corporation Reaction Motors Division Denville, New Jersey	1
20.	Mr. James P. Coughlin Solid Rocket Plant, Building 0525 Aerojet-General Corporation Sacramento, California	1
21.	Dr. Alfred Buchler Arthur D. Little, Inc. Acorn Park Cambridge 40, Massachusetts	1
22.	Dr. Paul Bender Department of Chemistry University of Wisconsin Madison, Wisconsin	1
23.	Dr. K. Keith Innes Department of Chemistry Vanderbilt University Nashville, Tennessee	1
24.	Dr. T. E. Phipps Department of Chemistry University of Illinois Champaign-Urbana, Illinois	1
25.	Mr. Ludwig Fasolino National Research Corporation 70 Memorial Drive Cambridge 42, Massachusetts	1
26.	Dr. Philipp Gross Fulmer Research Institute, Lt'd. Stoke Poges, Buckinghamshire England	1

	Addressee	Copies
27.	Dr. Charles J. Marsel Department of Chemical Engineering New York University University Heights New York 53, New York	1
28.	Dr. Thomas A. Milne Midwest Research Institute 425 Volker Boulevard Kansas City 10, Missouri	1
29.	Dr. John D. Rockenfeller United Aircraft Corporation Research Laboratories East Hartford 8, Connecticut	1
30.	Dr. R. W. Kebler Union Carbide Corporation P. O. Box 278 Tarrytown, New York	1
31.	Dr. S. H. Bauer Department of Chemistry Cornell University Ithaca, New York	1
32.	Dr. Robert D. Freeman Department of Chemistry Oklahoma State University Stillwater, Oklahoma	1
33.	Dr. Robert E. Torley American Cyanamid Company Stamford Research Laboratories 1937 West Main Street Stamford, Connecticut	1
34.	Professor Paul R. Jones Department of Chemical Engineering West Virginia University Morgantown, West Virginia	1
	Defense Documentation Center Building # 5, 5010 Duke St. Alexandria 4, Virginia	20

	Addressee	Copies
35.	Dr. George B. Rathmann Central Research Laboratories Minnesota Mining and Manufacturing Company 2301 Hudson Road St. Paul 19, Minnesota	1
36.	Dr. Leo Brewer Department of Chemistry University of California Berkeley, California	1
37.	Miss Carol Funk NASA Headquarters Code: MEG Washington 25, D. C.	1
38	Dr. Alan Snelson Armour Research Foundation 10 West 35th Street Chicago 16, Illinois	1
39	Dr. Guy Waddington National Academy of Sciences 2101 Constitution Avenue, NW Washington, D. C.	1
40.	Dr. Leon Green, Jr. Lockheed Propulsion Company P. O. Box 111 Redlands, California	1
41.	Dr. R. O. MacLaren United Technology Corporation Research and Advanced Technology Division Sunnyvale, California	1
42.	Dr. Kurt Mueller Rocketdyne Division of North American Aviation 6633 Canoga Avenue Canoga Park, California	1

UNCLASSIFIED